Army Science & Technology

Ground Portfolio Overview

Mr. Matthew Donohue
Director Ground Portfolio
Office of the
Deputy Assistant to the Secretary of the Army
for Research and Technology

DESIGN • DEVELOP • DELIVER • DOMINATE
SOLDIERS AS THE DECISIVE EDGE

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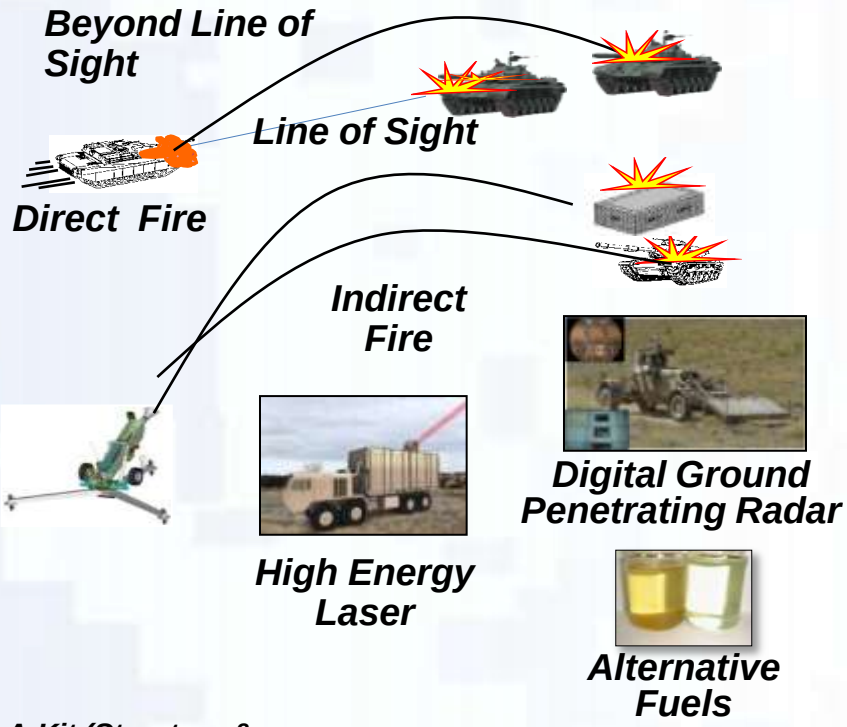
Ground Portfolio Vision Statement

Vision

U.S. Overmatch in weapons and military vehicles for offensive and defensive capabilities

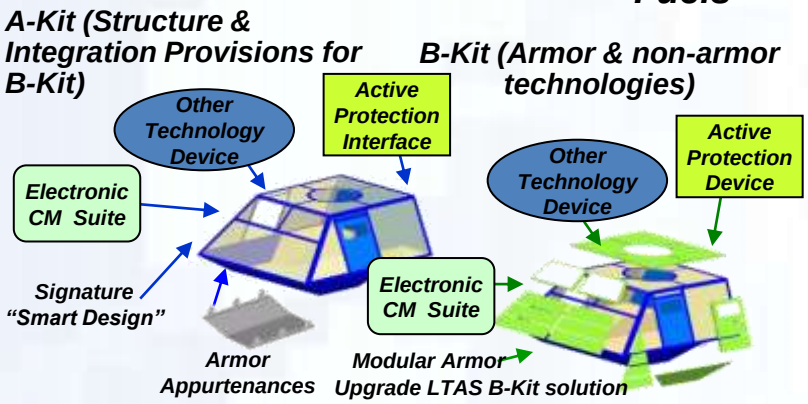
Strategy: Invest in technologies which increase performance & affordability of Army Ground Systems against a capable enemy



Multi-functional Armor

Combat Vehicle B & C-kit Armor Maturation / Integration

Autonomous Platform Demonstrator



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FY14

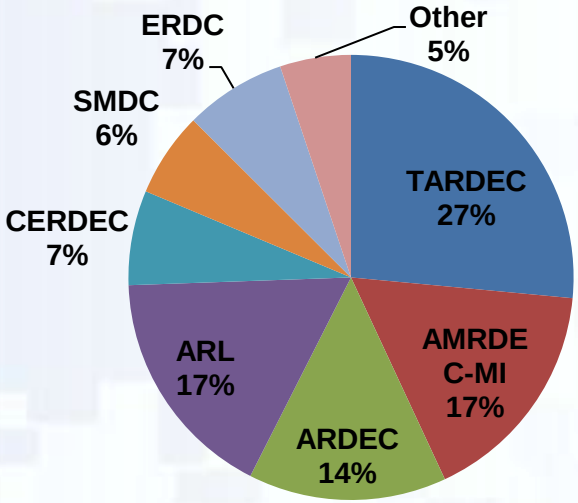
Ground Portfolio Funding

Ground Portfolio

6.2, 6.3 and 6.7 Funding

$634M

Ground Investments by Organization



*Other Includes:
ECBC
RDECOM
HQDA

Survivability Sub-portfolio

$199M

Investment Areas
- Vehicle Protection
- Deployable Force Protection
- Adaptive Protection

Weapons Sub-portfolio

$268M

Investment Areas
- Air Defense
- Directed Energy
- Fire Support
- Close Combat
- Weapon Enablers

Ground Platforms Sub-portfolio

$101M

Investment Areas
- Power & Electronics
- Ground Vehicle Robotics
- Logistics

Mobility / Countermobility Sub-portfolio

$66M

Investment Areas
- Countermine & IED
- Austere Entry & Maneuver
- Obscurants

Source: Army Science and Technology Management Information System (ASTMIS) PB14

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Weapons Sub-Portfolio

Goal: Be the world leader in developing weapon systems that are more affordable, have improved performance, and provide increased survivability under any conditions.

S&T Major Efforts include:

- Counter RAM, UAS, CM
- Solid State High Energy Laser
- Tank-Fired Kinetic Energy
- Medium Caliber Weapons
- Long Range Fires
- Extended Range Artillery/Mortars
- Close Combat Missiles
- Component Technologies

Near-Term Goals:

- Low Cost precision
- Extended Range
- Disrupt offensive Indirect Fires
- Prevent Surveillance/Attack
- Increase laser efficiency

Mid/Far-Term Goals:

- High energy density insensitive energetic materials
- Lighter weight, multi-purpose weapons
- Selectable yield weapons
- Increase laser irradiance on target
- Remotely operated weapons

Legacy/Existing Systems:

- Artillery
- GMLRS
- Mortars
- 120mm Tank
- Medium Caliber
- TOW
- Javelin
- Stinger
- Patriot
- Sentinel

Army Labs:

- AMRDEC
- ARDEC
- SMDC
- ARL
- ERDC

Army Stakeholders:

- PEO M&S
- PEO AMMO
- Fires Center of Excellence
- Maneuver CoE
- G-8 Force Development

External Stakeholders:

- USMC
- MDA
- USN
- DARPA
- ASD(R&E) Weapons Community of Interest

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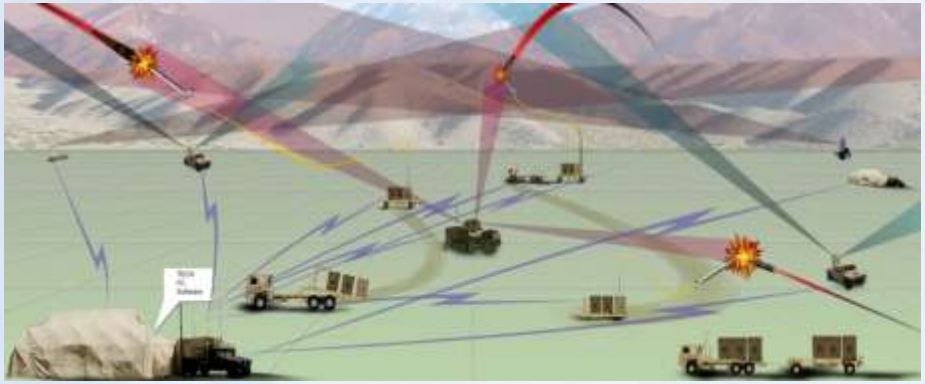
Extended Area Protection & Survivability (EAPS)



Purpose:

Mature and demonstrate technologies that provide mobile, 360˚ hemispherical extended area protection against simultaneous, asymmetric RAM attacks with improved performance over the currently fielded Counter-RAM (C-RAM) capability, the Land-based Phalanx Weapon System (LPWS).

Program Demonstrates:

- **Interceptor technology to defeat RAM threats**
  - **Missile-based Interceptor**
  - **Guided 50mm Bullet**
- **Technical Fire Control capable of generating and executing a firing command**

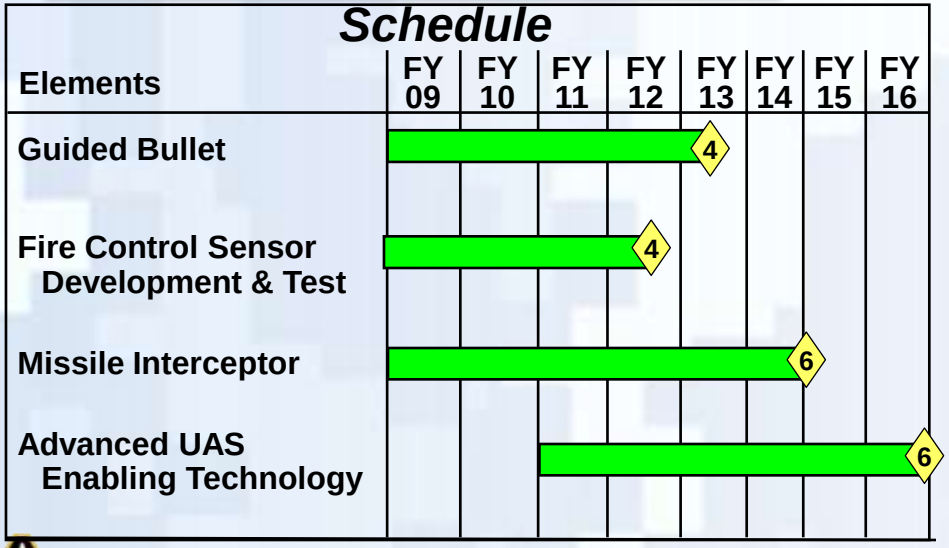
Warfighter Payoff:

- **Demonstration of missile and gun launched interceptors compatible with existing and planned Force Structure**
- **Smaller footprint and significant reduction in manpower, vehicles, and other ground support equipment**
- **Compatible with existing and planned Force Structure**

Program Performance Goals

Defendable radius	2.5-4 km (Msl); 0.5-2.0 (Gun)
Kill probability	>0.8
Engagement rate	20-48 in 20 sec
Stored engagements	>30 per launcher
Coverage	360˚ hemispherical

Schedule



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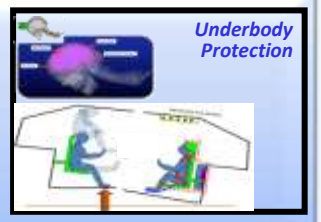
Survivability Sub-Portfolio

Goal: Provide unmatched levels of protection for our Warfighters against current and emerging threats through the identification, development, and integration of affordable, lightweight survivability technologies

S&T Major Efforts Include:

- Vehicle Ballistic Protection
- Underbody Blast Mitigation
- Combat Vehicle Armor
- Active Protection
- Deployable Force Protection
- Adaptive Protection



Near-Term Goals

Vehicles:

- Provide occupant survivable vehicle design
- Increase protection at reduced weight
- Develop APS Architecture

Bases:

- Lightweight rapidly erected protective structures
- Overhead protection against indirect and direct fire

Mid/Far-Term Goals

Vehicles:

- Advanced M&S and evaluation capabilities
- Lighter Underbody Blast Mitigation for larger threats
- Demonstrate Adaptive Armor

Bases:

- Modular, scalable, reusable protective structures
- Structural reinforcement and retrofit capabilities

Legacy/Existing Systems:

- Abrams
- Bradley
- Stryker
- MRAP
- JLTV
- HMMWV
- Modular Protective Systems
- Iraq Overhead Cover System
- Concrete T-Walls

Army Labs:

- TARDEC
- ARL
- ERDC
- CERDEC
- ARDEC
- AMRDEC
- SMDC

Army Stakeholders:

- PEO GCS
- PEO CS&CSS
- JPEO CBD
- PEO M&S
- PEO C3T
- MCOE
- MSCOE
- G-8 FD

External Stakeholders:

- DARPA
- NAVY
- OSD RFD
- USMC
- AFRL

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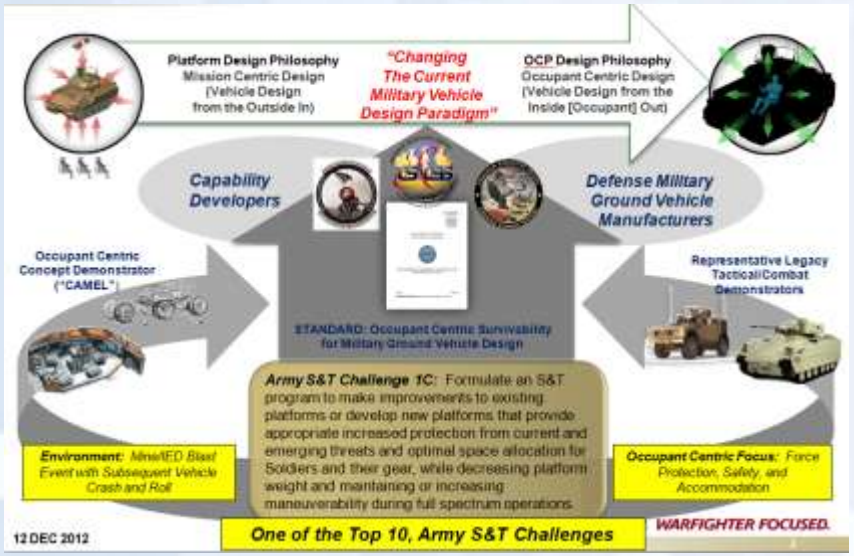
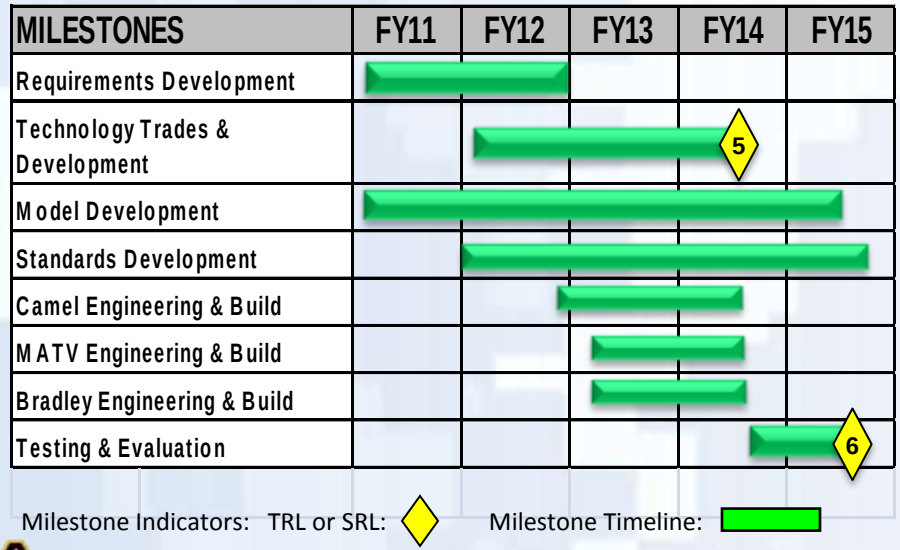
Occupant Centric Platform (OCP)



Schedule



Purpose:

Formulate an S&T program to make improvements to existing platforms or develop new platforms that provide appropriate increased protection from current and emerging threats and optimal space allocation for Soldiers and their gear, while decreasing platform weight and maintaining or increasing maneuverability during full spectrum operations.

Products:

- **Occupant Centric Vehicle Design Handbook for PMs and Military Ground Vehicle Manufacturers**
- **CAMEL "New Start" Engineering Test Bed**
- **Representative Combat/Tactical Vehicle Demonstrators**

Payoff:

- **Change the Military Ground Vehicle Design and development paradigm – force protection, safety, and accommodation become essential design considerations**
- **Develop an Occupant Centric design, development, and test guideline for use by PMs; directive to contractors**
- **Transition OCP knowledge to the PMs and Military Ground Vehicle Manufacturers**

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Ground Platforms Sub-Portfolio

Goal: Design, evaluate, optimize and integrate advanced energy-efficient ground vehicle technologies to enhance capabilities and reduce logistical burdens. Additionally, develop advanced electrical power generation, management, distribution and energy storage system for combat and tactical vehicles.

S&T Major Efforts Include:
- Mission Power
- Vehicle Electronics
- Energy Storage
- Fuels and Lubricants
- Ground Vehicle Robotics

Near-Term Goals
- Improved Fuel Economy
- Power & Electronics Management (VICTORY)
- High Voltage power architecture
- Increased available power
- Driver assist technologies
- Robotics enabling technologies
- Mature SiC components
- Single Powertrain Lubricant

Mid/Far-Term Goals
- Advanced propulsion
- Implement VICTORY Power architecture
- Double power and energy density
- Improve fuel efficiency/output
- Optionally Manned vehicles
- Robotic Wingman teaming

Legacy/Existing Systems:
- Abrams
- Bradley
- Stryker
- FMTV
- HEMTT & PLS
- TALON
- MRAP
- JLTV
- HMMWV
- Hercules
- Packbot
- MTRS

Army Labs:
- TARDEC
- ARL
- CERDEC

Army Stakeholders:
- PEO CS&CSS
- PEO GCS
- RS JPO
- ASA (IE&E)
- MCOE
- MSCOE
- G-8 FD

External Stakeholders:
- DLA
- NAVY
- DARPA
- NATO Partners

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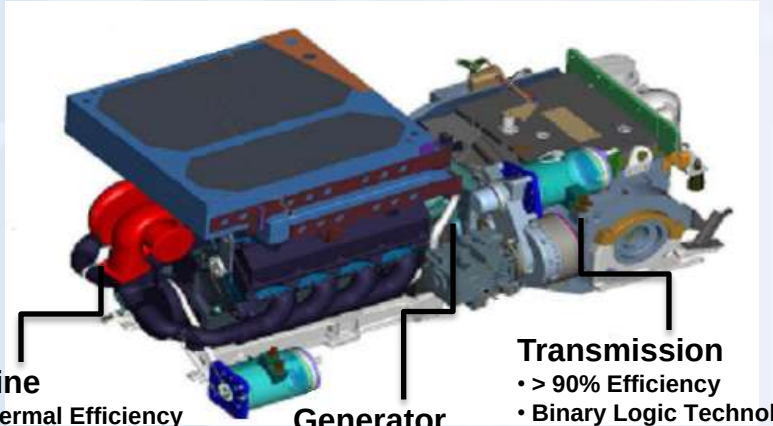
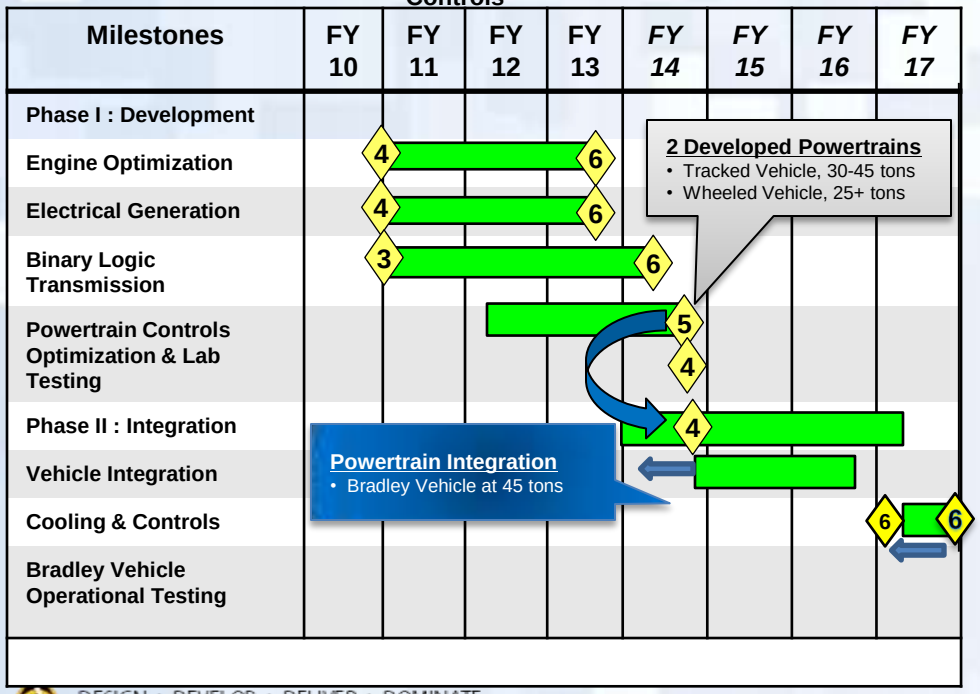
Efficient Powertrain Technologies



Engine
- ↑ Thermal Efficiency
- ↓ Heat Rejection
- Multiple Fuel Controller

Generator
- On-Board Power
- Export Power
- Controls

Transmission
- > 90% Efficiency
- Binary Logic Technology
- Wide-spread, equally progressive gear ratios
- Integrated controls



Purpose

Develops efficient, reliable powertrain that:
- decreases fuel consumption
- requires less space
- improves vehicle mobility

Products

- *Phase I:* 2 TRL 5 powertrains (one for tracked, one for wheeled). Components TRL 6:
  - Optimized COTS Engine
  - Binary Logic Transmission
  - 150kW Electrical Generator
- *Phase II:* Bradley vehicle integration: binary-logic transmission mated to the Cummins V903 engine demonstrating Bradley Mission profile performance

Payoffs

- 15-20% increased vehicle range
- Electrical power generation for future power demands.
- High efficient powertrain operating on a wide range of fuels, with reduced heat generation

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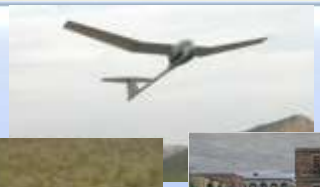
Mobility/Counter-mobility Sub-portfolio

Goal: Enable maneuver forces to move at will in all terrains and threat scenarios.

S&T Major Efforts include:

- Explosive Threat Detection Technologies
- Explosive Threat Neutralization
- Austere Entry and Maneuver
- Advanced Obscurants



Near-Term Goals:

- For Route Clearance
  - Reduce Interference
  - Increase depth
  - Improve dismounted detection (non-metallic and wires)
  - Increase rate of advance
- Improved Bridging of Wetlands and Mudflats
- Improved embarkation location assessment capability
- Decrease obscurant material hazards

Mid/Far-Term Goals:

- For Route Clearance
  - Standoff neutralization
  - Hyperspectral sensors for buried explosive detection
  - Increased rate of advance
- Improved embarkation location assessment capability
- Expedient airfields for vertical and short take-off and landing

Legacy/Existing Systems:

- Husky Mounted Detection System
- Lightweight Modular Causeway System
- AN/PSS-14
- GEOTACS

Army Labs:

- CERDEC
- ERDC
- ECBC
- ARL
- ARDEC

Army Stakeholders:

- PEO AMMO
- PEO IEW&S
- PEO CS&CSS
- MSCOE
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External Stakeholders:

- DARPA
- JIEDDO
- ASD (R&E) C-IED Community of Interest
- USMC
- USN

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Digital Ground Penetrating Radar (Digital GPR)

Purpose:
Demonstrate advanced down-looking Ground Penetrating Radar (GPR) technology with enhanced capability to detect low contrast buried explosive threats and to interoperate with Electronic Countermeasure (ECM) devices for vehicle-mounted detection systems

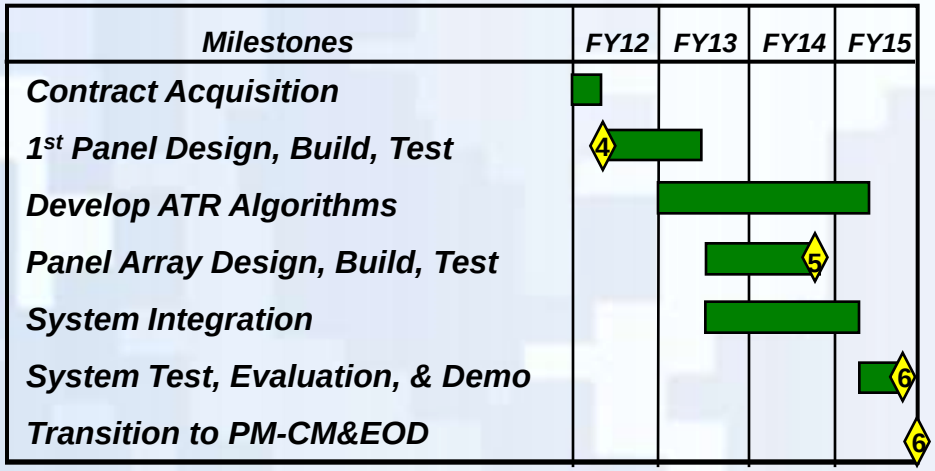
Product:
TRL-6 prototype of 5-panel Digital GPR array demonstrated as part of a test bed detection system

- **Up to 30 dB increase in signal-to-noise ratio resulting in a Pd of ≥ 90% for low contrast IEDs & Anti-Tank (AT) mines**
- **Reduction in current required separation distance from U.S. ECM devices by at least 50%**
- **Results of detection performance and interoperability testing**

Payoff:

- **Enhanced effectiveness and survivability for route clearance operations**
- **Operate within the ECM "bubble"**

Schedule



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Ground S&T Portfolio Summary

- Ground Portfolio Challenges
  - Portfolio is Diverse
  - Mostly Military-unique technology
  - Must maintain technical competency in focused areas

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WebPortal for Army wide Industry Engagement

Defense Innovation Marketplace

http://defenseinnovationmarketplace.mil/armyInformation.html

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Army Science & Technology

Providing Soldiers Technology Enabled Capabilities

MAINTAINING A LEADING EDGE IN TECHNOLOGY